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# NOTES ON ANOPLURA AND MALLOPHAGA, FROM MAMMALS, WITH DESCRIPTIONS OF FOUR NEW SPECIES AND A NEW VARIETY OF ANOPLURA.

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Under an arrangement made by the Department of Entomology of Stanford University with Dr. Joseph Grinnell, director of the Museum of Vertebrate Zoölogy of the University of California, the author was enabled to accompany a collecting party from the museum, engaged during the summer of 1915 in a Biological Survey of Yosemite National Park, with the privilege of examining for parasites all the birds and mammals taken by the expedition. In addition, through the kindness of Dr. Grinnell, the author was also permitted to examine the skins in the museum, and it is upon the material obtained in these two ways, that this paper is for the most part based. It is in the nature of a supplement to "The Anoplura and Mallophaga of North American Mammals," by V. L. Kellogg and G. F. Ferris (1915), in which there is a discussion of most of the old species listed in this paper, together with a host list of the Anoplura and Mallophaga from North American mammals.

The examination of museum skins has proven to be an excellent method of collecting Mallophaga and Anoplura, nearly as much material being procured in a few days of such work as could be obtained in an entire summer of field collecting. There is some danger that records obtained in this manner may be unreliable due to the packing together of different hosts, but this danger is really astonishingly small, although cases of this nature were, indeed, met with. Certainly all records based entirely upon the examination of museum skins should be checked up by field

collecting wherever any doubt arises. There is the further disadvantage that large skins are usually carefully cleaned when they are tanned and all the parasites are necessarily lost, but undoubtedly assiduous collecting in our museums will add greatly to our knowledge of the Anoplura and Mallophaga.

The mammals which were examined without finding parasites should be recorded as well as those from which parasites were taken. About fifteen fresh specimens of *Ochotona albata* (cony, rock rabbit or pika) and several skins of this and a related species, *Ochotona schisticeps*, were examined with negative results. The finding of Anoplura upon members of this genus would be of much interest since these animals are the nearest relatives of the rabbits and it is to be expected that their parasites should be related to the parasites of the rabbits.

Several specimens of *Aplodontia californica* were examined, also with negative results. It seems probable that the members of this genus harbor no Anoplura or Mallophaga since the author has previously examined a number of specimens with the same result. The examination of a few fresh specimens and many skins of moles of the genus *Scapanus* failed to produce any parasites although an Anopluran species is accredited to the eastern moles of the genus *Scalopus*. Nor was anything found upon any shrews, although numerous individuals of two or three species of Sorex and Neosorex were examined.

The descriptions of new species and notes on old species follow:

## Mallophaga.

### Trichodectes retusus Nitzsch.

Numerous specimens from two individuals of *Martes* sp?, the Pine Marten, a single specimen from *Gulo luscus* ssp?, a wolverine (all taken at Lyell Canyon, Mariposa Co., Calif.) and a single immature specimen from a skin of *Mustela vison nesolestes* (Admiralty Is., Alaska).

This species was originally described from an Old World weasel and has been reported from mink and weasel in North America. It is distinguished from the other Mustelid-infesting species of *Trichodectes* by the fact that the antennæ are similar in male and female.

**Trichodectes quadraticeps** Chapman.

Several specimens from a skin of *Vulpes cascadensis* (Mt. Shasta, Calif.).

This species has previously been recorded only from *Urocyon californicus* and there has been no record of any Mallophagan from a North American species of *Vulpes* although a species, *Trichodectes vulpis*, has been recorded from a European *Vulpes*. It is possible that these two species will prove to be the same.

**Trichodectes mephitidis** Osborn.

Many specimens from *Bassariscus astutus raptor* (Pleasant Valley, Mariposa Co., Calif.) and from skins of the same host from several other localities in California. The occurrence of *T. mephitidis* upon this host seems rather anomalous as this species is typically mustelid-infesting; however, it seems to be normally present upon *Bassariscus* as well. Another species, *T. thoracicus* Osborn, has also been described from the same host.

**Trichodectes geomydis** Osborn.

From *Thomomys monticola* (Yosemite National Park, Calif.) and skins of *Geomys cumberlandius* (Cumberland Is., Ga.).

ANOPLURA.

**Polyplax spinulosa** Burm.

From *Microtus* (*Lagurus*) *intermedius* (Pine Forest Mts., Nev.).

**Polyplax auricularis** Kellogg & Ferris.

From *Peromyscus maniculatus gambeli* (Yosemite National Park, Calif.) and skins of *Onychomys torridus pulcher* (Victorville, Calif.) and *Onychomys leucogaster arcticeps* (Colorado Springs, Colo.). Previously recorded from *Peromyscus maniculatus rubidus* (Inverness, Marin Co., Calif.) and *Peromyscus sitchensis prevostensis*, (Forrester Is., Alaska).

Host of the type, *Peromyscus maniculatus rubidus*.

**Linognathoides montanus** Osborn.

From *Marmota flaviventris sierræ* and *Citellus beldingi* (Yosemite National Park, Calif.) and skins of *Cynomys leucurus* (Routt Co., Colo.), Citellus oregonus (Pine Forest Mts., Nev.), Citellus gram-

murus (Santa Catalina Mts., Ariz.) and Citellus plesius ablusus (Prince William Sound, Alaska). The specimens from *Marmota* are somewhat larger than those from any of the numerous other hosts and there are slight differences in the shape of the sternal plate but there seem to be no good grounds for regarding this form as at all specifically or varietally distinct. Host of the type, *Sciurus cinereus.*

**Linognathoides inornatus** Kellogg & Ferris.

From *Neotoma cinerea cinerea* and *N. fuscipes streatori* (Yosemite National Park, Calif.). This species was referred to *Linognathoides* because of the entire absence of chitinized tergal and sternal plates but the specimens obtained from *Neotoma fuscipes* have the anterior division of each tergite and sternite distinctly chitinized although in all other respects they agree entirely with the specimens from *N. cinerea.* It may be that this form should be separated as a new species but I have not sufficient material to justify me in doing so. It is evidently rather uncommon in its occurrence for it has been found on but one individual out of dozens examined while the form occurring upon *N. cinerea* is present upon practically every individual of its host species.

**Neohaematopinus pacificus** Kellogg & Ferris.

From *Eutamias alpinus* and *Eutamias speciosus frater* (Yosemite National Park, Calif.) and *Eutamias merriami pricei* (Stanford University, Calif.).

Host of the type, *Eutamias townsendi ochrogenys* (Cazadero, Sonoma Co., Calif.).

**Neohæmatopinus antennatus** Osborn, var. **semifasciatus** var. nov.

From *Sciurus douglasi mollipilosus* (Cazadero and Freestone, Sonoma Co., Calif.) and *Sciurus douglasi albolimbatus* (Yosemite National Park, Calif.). In the "Anoplura and Mallophaga of North American Mammals" this form was included with *N. antennatus* Osborn, but it should be separated as at least varietally distinct. It differs constantly from *N. antennatus* in having the anterior division of each abdominal tergite and sternite distinctly chitinized but resembles *N. antennatus* in all other respects. *N. pacificus* K. & F., which also has the anterior division of the

tergites and sternites chitinized is readily distinguishable by the difference in the pleural plates. The new variety is evidently rather close to *N. sciurinus* (Mjöberg) from *Sciurus vulpinus* (Europe) and may prove to be identical with that species but the description of the latter is too incomplete to permit of any certainty. Host of the type, *Sciurus douglasi albolimbatus.*

### Neohæmatopinus sciuropteri Osborn.

Numerous specimens from *Glaucomys sabrinus lascivus* (Yosemite National Park, Calif.), better known as *Sciuropterus.* The description of this species was based upon the male and apparently but two specimens of the species have heretofore been known. The

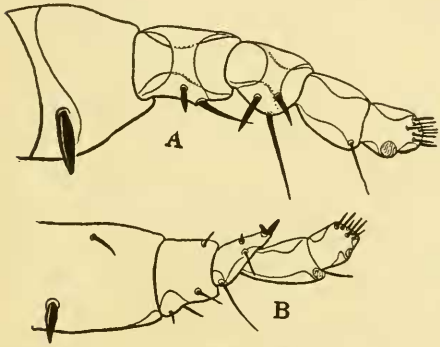


Fig. 1. *Neohæmatopinus sciuropteri* (Orb.); A, antenna of female, B, antenna of male, vertical side.

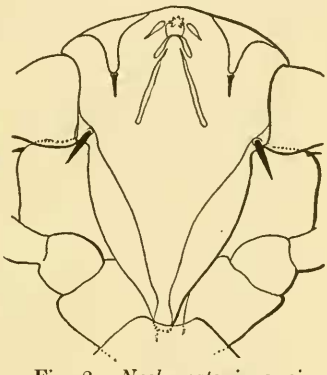

Fig. 2. *Neohæmatopinus sciuropteri* (Orb.); vertical side of head.

figures in "Anoplura and Mallophaga of North American Mammals" were made from a single imperfect male and prove to be wrong in certain respects. There is no spine on the posterior margin of the first antennal segment, as was there figured, this spine really being on the head immediately at the base of the antenna. Furthermore the sternal plate has the posterior lateral angles produced into slight points instead of having the posterior margin straight.

The absence of a spine on the posterior margin of the first antennal segment leaves the emarginate posterior margin of the second tergite in the male as the only positive character separating this species from *Polyplax.* The female can be separated from

the females of the various species of *Polyplax* only by its extremely broad head and the stout spine at the base of each antenna. The female in general resembles the male, but has the antennæ simple, that is without a preaxial process on the third segment, and lacks the emargination of the posterior margin of the second abdominal tergite.

### Hæmodipsus ventricosus Denny.

Numerous specimens from skins of *Lepus californicus* (Arcata, Humboldt Co., Calif.) and *Lepus californicus deserticola* (Ehrenberg, Ariz.). The male, which has never been adequately described, is similar to the female except for its much smaller size. The genitalia are very large and conspicuous, the basal plate being long and relatively slender, the parameres about half as long as the basal plate and very broad and heavy. Penis very small and inconspicuous.

Fig. 3. *Hæmodipsus ventricosus* (Denny); genitalia of male.

It should be noted that the sternal plate is not as regularly hexagonal as it is figured in "Anoplura and Mallophaga of North American Mammals," the posterior margin being longer than the anterior and closer to the lateral angles.

### Fahrenholzia pinnata Kellogg & Ferris.

From *Perodipus* sp? (Coulterville, Mariposa Co., Calif.) and skins of *Dipodomys merriami* ssp. (Independence, Inyo Co., Calif.), *Dipodomys deserti* (Mecca, Riverside Co., Calif.), *Microdipodops polionotus* (Benton, Mono Co., Calif.) and *Perognathus parvus olivaceous* (Pine Forest Mts., Nev.).

Host of the type, *Dipodomys californicus*.

### Fahrenholzia tribulosa sp. nov.

From *Perognathus californicus* ssp? (Pleasant Valley, Mariposa Co., Calif.), and *Perognathus formosus* (Victorville, Calif.). This is a very distinct form that differs markedly from *F. pinnata* in the character of the male

genitalia. The head is entirely destitute of spines and in the form chosen as the type of the species there are six pairs of pleural plates instead of three as in *F. pinnata*. The specimens from *Perognathus formosus*, however, have but three pairs of pleural plates although they agree with the type in all other particulars. Further collecting may justify the separation of these two forms. The name is from the Latin meaning thorny.

Host of the type, *Perognathus californicus*.

Description of female: Length, 1.65 mm.; length of head, .16 mm.; length of abdomen, 1.15 mm.; width of head, .15 mm.; width of thorax, .16 mm.; width of abdomen, .45 mm.

Head triangular in shape, rather sharply pointed anteriorly and with very shallow antennal sinuses. No hairs on either dorsal or ventral side except for a few very small hairs on the anterior margin and about the rostrum. Antennæ set well back from the anterior margin, five-segmented, rather slender and with all the joints subequal in length.

Thorax about as long as the head and slightly wider, with the lateral margins parallel and nearly straight. No hairs on either dorsal or ventral sides. Sternal plate regularly oval in shape. First pair of legs small with slender claw, second and third pairs very large and stout with stout, heavy claw, and

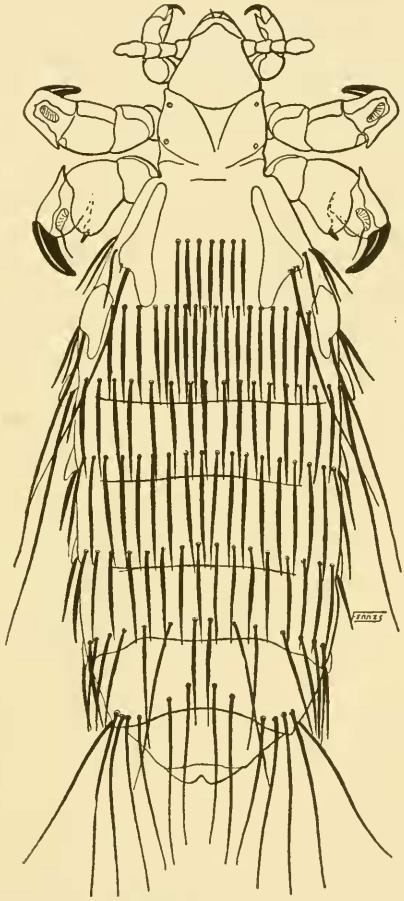

Fig. 4. *Fahrenholzia tribulosa* sp. nov.; female.

with the outer anterior angle of the tarsus produced into a distinct point.

Abdomen elongated with nearly parallel sides, entirely without chitinized tergal and sternal plates, the derm having a reticulated appearance. Each segment, except the first and second, with a single transverse row of stout spines that are somewhat longer than the segment. First and second segments apparently fused, the first without spines. Second segment with six to eight spines. Third to sixth segments with eighteen to twenty-two spines, all spaced very closely. Seventh with about sixteen spines which are for the most part longer and more slender than those on the other segments, the second from the meson on each side being especially long and slender, reaching beyond the end of the abdomen. Eighth segment with about twenty long, slender hairs. On the ventral side the arrangement of the spines is in general similar, except that the eighth segment bears no spines and the ninth has a group of stout spines near each lateral margin.

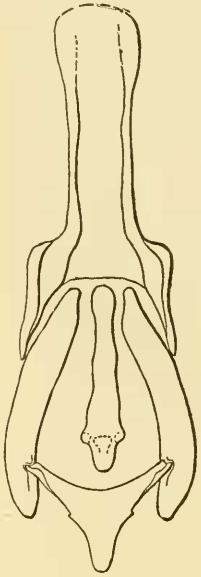

Fig. 5. *Fahrenholzia tribulosa* sp. nov.; genitalia of male.

Six pairs of pleural plates present. The first pair, which may be assigned to the second segment, is divided into two parts, one lying on the dorsal side of the abdomen and the other on the ventral side with three or four spines in the space between. The dorsal piece is long, somewhat broadened posteriorly, with the inner posterior angle extended into a roundly pointed process and bears a single very long hair and an inconspicuous spine on the posterior margin. The ventral piece is shorter, somewhat broadened at the posterior end and bears no spines. Plates of the third segment appressed to the dorsum and partially overlapping the fourth segment; inner posterior angle produced into a rounded tooth and a single long hair on the posterior margin. Plates of the fourth segment similar but smaller, projecting from the body wall and likewise bearing a long stout hair. Plates of the fifth to seventh segments similar to those of the fourth but somewhat smaller and without hairs.

Description of the male: Length, 1.15 mm.; length of head, .16 mm.; length of abdomen, .9 mm.; width of head, .15 mm.; width of thorax, .16 mm.; width of abdomen, .41 mm. Similar to the female except for its smaller size. End of the abdomen rounded. Genitalia of a very different type from those of *F. pinnata*, the basal plate rather short and slender, widening abruptly to the posterior end and with the posterior margin deeply concave. Parameres stout, nearly as long as the basal plate, diverging posteriorly and partially enclosing the penis which is short and stout, with short, widely diverging arms.

### Enderleinellus longiceps Kellogg & Ferris.

From skins, in the Stanford University collection, of *Sciurus niger rufiventer* (De Kalb Co., Ind.) and *Sciurus arizonensis huachucha* (Huachucha Mts., Ariz.).

The specimens from *S. niger* agree very well with the type, but those from *S. arizonensis* are referred to this species provisionally, further study and more material may, perhaps, show them to be distinct. The host of the type is recorded only as "Western Gray Squirrel" (Lincoln, Neb.) and may be either *S. niger rufiventer* or *S. carolinensis carolinensis*, both of which occur in that locality.

### Enderleinellus kelloggi sp. nov.

Many specimens, both males and females, from *Sciurus griseus griseus*, (Pleasant Valley, Mariposa Co., Calif.) and *Sciurus griseus nigripes*, (Stanford University, Calif.), the type being from the latter.

This species is close to *E. longiceps* K. & F., the only really tangible differences between the two being found in the genitalia of the males. In *E. longiceps* the parts of the male armament are very large and very heavily chitinized, while in the new species they are weakly chitinized, smaller and altogether much less conspicuous. The females of the two species are, on the other hand, practically indistinguishable from each other, although the head of the new species is a trifle the shorter.

Named in honor of Prof. Vernon L. Kellogg, by whom this work has been made possible.

Description of the female: Total length, .76 mm.; length of

head, .14 mm.; length of abdomen, .55 mm.; width of head, .1 mm.; width of thorax, .15 mm.; width of abdomen, .31 mm.

Head rather cylindrical, the anterior margin very flatly rounded, the lateral margins parallel and practically straight, the temporal angles entirely wanting. Antennæ set close to the anterior margin, the second joint the longest, the others subequal. Last three joints slightly wider than the second, giving the antennæ a slightly clavate appearance.

Thorax about one and one half times as wide as the head and slightly more than half as long. Lateral margins angularly convex, posterior margin straight, the thorax as a whole having the appearance of a distorted hexagon. A pair of rather long median hairs on the posterior margin of the mesothorax and a short spine slightly in from each mesothoracic spiracle.

Legs of the type common to the genus, the anterior and middle pairs being small and having slender claws, the posterior pair being very large and stout. Sternal plate spatulate, a narrow handle-like portion projecting between the anterior coxæ.

Abdomen oval, only slightly longer than wide, the greatest width being near the center. Tergites and sternites without chitinized plates and with the exception of the third sternite, undivided and bearing but one transverse row of spines. The spines are in general rather slender, bluntly pointed, and slightly longer than the segment on which they are borne. First to third segments each with a median group of four spines, the third also having a pair of spines near each lateral margin. Fourth and fifth segments each with a median group of eight or ten spines and lateral groups of three or four. Sixth and seventh segments each with a continuous row of eighteen or twenty spines. Eighth with median group of six or eight. Seventh and eighth segments each with two long hairs at the posterior lateral angles. Ninth segment with a narrow, transverse, chitinous band behind which there is a median pair of two small hairs.

Second sternite with a median group of four to six slender spines. Third sternite apparently with two rows of spines, the anterior consisting of four, the posterior of eight, and with the pair of chitinized areas which are practically characteristic of the genus. Fourth sternite with eight spines, fifth and sixth with twelve, seventh with eight, eighth with none. Ninth segment with a group

of small spines and a lobe-like process, which bears a single stout spine, at each posterior angle.

Pleural plates present on the second to fifth segments, rather triangular in shape, with the posterior angles rounded and the posterior margin slightly emarginate. Each with a pair of very small spines on the posterior margin.

Description of the male: Total length, .62 mm.; length of head, .13 mm.; length of abdomen, .41 mm.; width of head, .1 mm.; width of thorax, .15 mm.; width of abdomen, .23 mm.

Head and thorax similar to those of the female. Abdomen, however, with narrow but distinct chitinized areas on the third to eighth tergites. First to third tergites with median group of four to six spines, fourth to eighth with median group of six which occupy the length of the chitinized area. Fourth and fifth with lateral groups of two spines, sixth to eighth with lateral groups of three or four. Seventh sternites without chitinized areas, the arrangement and number of the spines being as on the dorsum, with the exception of the double row on the third sternite. Pleural plates as in female.

Genitalia weakly chitinized, the parts of the mesosome being very small and inconspicuous. Basal plate divided into two slender parallel rods.

### Enderleinellus sphærocephalus Nitzsch.

*Pediculus sphærocephalus* Nitzsch, Germar's Mag. f. Ent., Vol. 3, p. 305 (1818); *Hæmatopinus sphærocephalus* Denny, Mon. Anopl. Brit., p. 36 (1842); *Polyplax (?) sphærocephalus* Dalla Torre, Genera Insec. Anoplura, p. 14; (1908); *Enderleinellus sphærocephalus* Fahrenholz, Zoöl. Anz., Vol. 39, p. 56 (1912).

From *Sciurus douglasi albolimbatus* (Yosemite National Park, Calif.), *S. hudsonicus vancouverensis* (Kuiu Island, Alaska) and *S. hudsonicus petulans* (Glacier Bay, Alaska).

The occurrence of this species upon some species of American squirrels and not upon others is an interesting point in the problem of the distribution of these ectoparasites. The range of *Sciurus griseus* coincides in part with the range of *S. douglasi*, in fact the two often live in the same trees, yet they harbor very distinct species of *Enderleinellus*. *S. douglasi* and *S. hudsonicus*, with their various subspecies, certainly get no closer than the width of Behring

Straits to *S. vulgaris* and its various subspecies of Europe and Asia, but all have what is apparently the same species of *Enderleinellus*. The student of these parasites is forced to the conclusion that the problem of their distribution is fundamentally the problem of the genetic relationships of their hosts.

### Enderleinellus suturalis Osborn.

Many specimens from *Callospermophilus chrysodeirus* and *Citellus beldingi* (Yosemite National Park, Calif.) and from skins of *Xerospermophilus tereticaudus*, (Imperial Co., Calif.), *Ammospermophilus nelsoni* (Bakersfield, Calif.), *Cynomys leucurus* (Routt Co., Calif.), *Cynomys gunnisoni* (Florissant, Colo.), *Citellus mollis* (Virginia Valley, Nev.), *C. townsendii* (Wallula, Wash.), and *C. grammurus* (Santa Catalina Mts., Ariz.).

This is a very puzzling species, a slightly different form appearing on each host genus and even on the different host species of the same genus. Some of these forms, such as *E. osborni* K. & F. appear to be worthy of being distinguished as separate species and perhaps some of the others should be regarded as varietally distinct. The form occurring upon *Callospermophilus* has been given the varietal name of *occidentalis* and this name may be retained for the present, although it is no more worthy of being so distinguished than are some of the others.

The host of the type of the species is *Citellus franklini* (Ames, Iowa).

### Enderleinellus uncinatus sp. nov.

From *Glaucomys sabrinus lascivus* (Yosemite National Park, Calif.).

This is probably the smallest known species of Anoplura and it is unique in other respects as well. In fact it is of such peculiar character that it might well be regarded as the type of a new genus. However, its affinities are clearly with *Enderleinellus* and in the present state of our knowledge of the Anoplura it is well to move slowly in the matter of multiplying genera, hence it seems best to regard this as an aberrant *Enderleinellus*.

Its affinities with *Enderleinellus* are shown in the character of the legs, the anterior and middle pairs being small and the posterior pair large and stout. The undivided abdominal tergites

and sternites of the abdomen also relate it to that genus. The characters in which it departs from the *Enderleinellus* type are the absence of a pair of small chitinized areas on the third sternite of the abdomen, the reduction in size if not total absence of pleural plates and the hook-like projections on the ventral side of the antennæ by which its name was suggested.

Description of female: Length, .375 mm.; length of head, .075 mm.; length of abdomen, .25 mm.; width of head, .075 mm.; width of thorax, .11 mm.; width of abdomen, .17 mm.

Head rather elongated and cylindrical, with the antennæ set close to the flatly rounded anterior margin. Temporal angles lacking, the hind head being but little wider than the fore head and having the temporal margins nearly straight and parallel. Occiput slightly pointed. A transverse suture immediately behind the antennæ, a very narrow chitinized band along the anterior margin and a slightly chitinized area along each temporal margin. Chætotaxy of the dorsal surface as follows: Several fine hairs along the anterior margin; a pair of small hairs on each

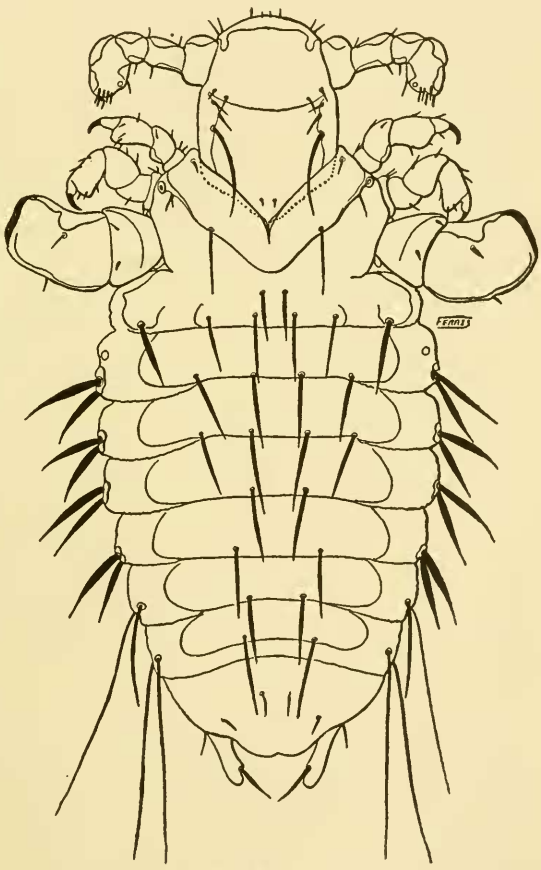

Fig. 6. *Enderleinellus uncinatus* sp. nov.; dorsal side of female.

side just in front of the transverse suture; two short spines followed by a long curved spine on each side at the inner edge of the chitinized area along the temporal margins.

Ventral side of the head with a narrow, irregularly shaped, chitinous area on each side extending from the anterior margin past the posterior margin of the antennæ. Immediately behind this area is a pair of small tooth-like projections followed by another chitinized area with three broad teeth on its posterior margin. No spines on the ventral side of the head.

Antennæ, five-jointed, the first joint quite broad the second longer and more slender. On the ventral side the first joint bears a series of four stout, hook-like projections and the proximal anterior angle of the third and fourth segments is produced into a short tooth.

Thorax about twice as broad as the head and somewhat shorter and with the lateral margins strongly convex. Posterior margin of the mesothorax with a short spine on each side just within the spiracle and a longer spine near the meson. Sternal plate very broad, the coxæ of each pair widely separated. First and second pairs of legs subequal, very small and weak and with small slender claws. Third pair very large and stout and quite short. All coxæ bearing a spine near the posterior margin, the spines on the posterior coxæ being large and conspicuous.

Abdomen elongated, broadest across the second segment, thence tapering gradually to a rounded point. Each tergite with single chitinized plate and a single transverse row of spines. First segment very small and with two small spines near the meson. Second segment with a single large spine near each outer margin and a group of four small spines on the posterior margin. Third and fourth segments each with a similar group of four spines. Fifth to eighth segments each with two spines near meson. Pleural plates either lacking or reduced to extremely small chitinized areas, which on the second to fifth segments bear a pair of extremely long, stout, sharp spines. Lateral margins of seventh segment with two hairs one of which is about twice as long as the other. Eighth segment with a pair of long hairs on lateral margins.

Sternites likewise undivided, the third to sixth with a distinct chitinized plate, the posterior lateral angle of which is produced into a sharp, knife-like process. Second and sixth segments each

with four short spines on the posterior margin, seventh with a single large stout spine at each posterior lateral angle and two spines on the posterior margin; eighth with a median pair close to its anterior margin. Posterior-lateral angles of the ninth segment produced into a rounded lobe which bears a spine near its tip.

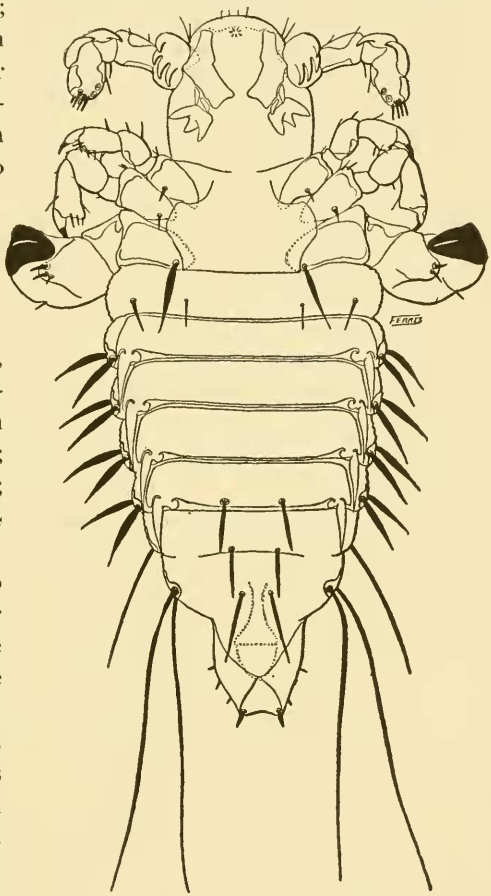

Fig. 7. *Enderleinellus uncinatus* sp. nov.; ventral side of male.

Description of male: Length, .35 mm.; length of head, .075 mm.; length of abdomen, .22 mm.; width of head, .075 mm.; width of thorax, .1 mm.; width of abdomen, .14 mm.

In general similar to the female except for slight differences in the arrangement of the spines on the abdomen. Abdomen ending in a broad truncate process which bears several short spines. Genitalia very weakly chitinized and so small as to render it impossible to work out the parts.

**Hoplopleura trispinosa** Kellogg & Ferris.

From *Glaucomys* (=*Sciuropterus*) *sabrinus lascivus* (Yosemite National Park, Calif.).

The male, which has not been described, is smaller than the female and none of the abdominal tergites and sternites are di-

vided into more than two plates. The genitalia afford an excellent specific character, differing markedly from the genitalia of *H. arboricola*, the nearest related species. The basal plate is expanded at each end, the parameres are very short and stout and do not enclose the penis as they do in *H. arboricola*, the arms of the penis fitting into slight notches in the ends of the parameres.

**Hoplopleura hesperomydis** Osborn.

From *Peromyscus maniculatus gambeli* (Yosemite National Park), skins of *Onychomys torridus pulcher* (Victorville, Calif.), and *Onychomys leucogaster arcticeps* (Colorado Springs, Colo.), and a freshly caught *Mus musculus* (Stanford University, Calif.). This species is very similar to *H. longula* (Neum.) from *Mus minutus* of Europe, of which *H. intermedia* Fahrenholz is beyond any doubt a synonym, but there are distinct differences in the pleural plates. The type of the species is from *Peromyscus* (=*Hesperomys leucopus* of the central states.

There are European records of Anoplura from *Mus musculus*, *Hoplopleura acanthopus* and *Polyplax serrata* having been credited to it, but this is the first North American record. It would be a matter of much interest to know if the same species occurs upon this host in Europe. The specimens from *Onychomys* differ somewhat from the others, the sternal plate being less rounded anteriorly and less sharply pointed posteriorly and the hairs on the abdomen being more numerous and much more slender, but the amount of material at hand is not sufficient to justify separating the forms.

**Hoplopleura arboricola** Kellogg & Ferris.

From *Sciurus douglasi albolimbatus*, *Sciurus griseus*, *Eutamias speciosus frater* and *Eutamias alpinus* (Yosemite National Park, Calif.), and *Eutamias merriami pricei* (Stanford University, Calif.).

The type of the species is from *Sciurus douglasi albolimbatus*.

**Hoplopleura hirsuta** sp. nov.

Five females and six males from skins of *Sigmodon hispidus* (Raleigh, N. C.), *S. hispidus texianus* (Rockport, Tex.) in the Stanford University collection, and *S. hispidus eremicus* (Sacaton,

Ariz. and Ft. Yuma, Calif.), in the Museum of Vertebrate Zoology of the University of California. Type from *S. hispidus.*

Curiously enough the affinities of this species are not with the species of *Hoplopleura* from other murids, but are with *Hoplopleura arboricola* K. & F., which occurs upon several species of sciurids. The females of these two species are in fact hardly distinguishable, but the genitalia of the males afford good characters for separating them. The sternal plate is much more pointed in the new species than in *H. arboricola* and there are slight but constant differences in the pleural plates.

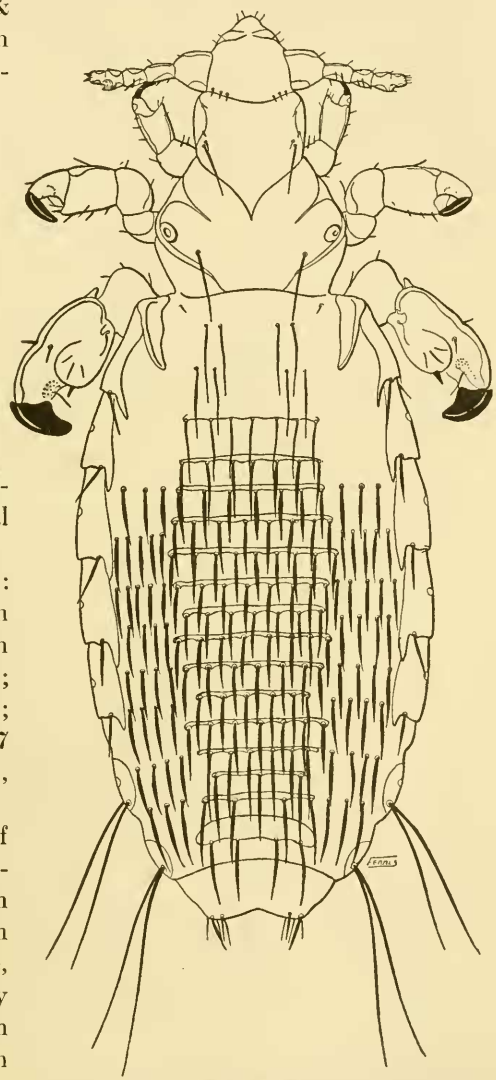

Fig. 8. *Hoplopleura hirsuta* sp. nov.; female

Description of female: Length, 1.4 mm.; length of head, .25 mm.; length of abdomen, 1.05 mm.; width of head, .16 mm.; width of thorax, .27 mm.; width of abdomen, .5 mm.

(The measurements of both sexes are from specimens that had been relaxed and cleared in caustic potash and are, therefore, probably somewhat greater than measurements from fresh specimens would be.)

Head rather elongated, widening but little behind the antennæ. Temporal margins very slightly convex and nearly parallel. A long slender hair and a very inconspicuous spine slightly in from the margin near each posterior lateral angle. A few extremely minute spines along the temporal angles, the anterior margin and the transverse suture behind the antennæ. Ventral side of the head with a single hair near the base of each antenna. Antennæ rather slender, of the type common to the genus.

Thorax slightly shorter than the head and about as wide as the head is long. Lateral margins strongly convex. Mesothorax with a single slender hair on each side just in from the spiracle. Sternal plate somewhat elongated, produced posteriorly into a blunt point; longer and more pointed than in *H. arboricola*. Legs of the type common to the genus.

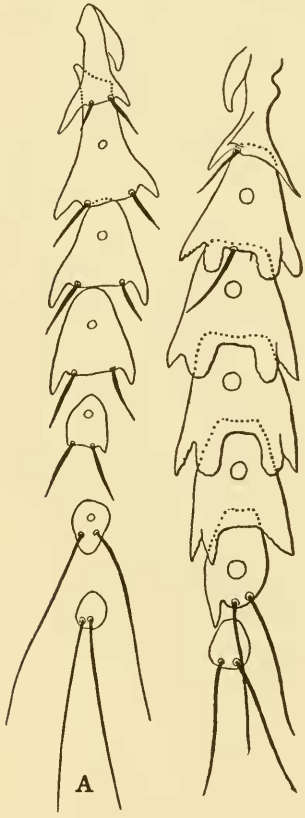


Fig. 9. *A*, pleural plates of *Hoplopleura hirsuta* sp. nov.; *B*, pleural plates of *Hoplopleura quadridentata* (Neum.).

Abdomen, elongated oval. First segment apparently without spines. Second tergite with two narrow transverse plates, each bearing two widely separated pairs of slender spines. Third segment with two plates, each with six or seven slender hairs. Fourth to seventh segments each with three very narrow plates, these plates being about half as long as the segments are wide. The plates of the fourth to sixth segments each bear six to eight awl-shaped spines. First plate of the seventh segment with six spines and the others with four each. Eighth segment with one plate and four spines. On the fourth to sixth segments there are, between the pleural plates and the tergites, two groups of three to five spines. The seventh segment bears one such group.

Pleurites of the first segment lying on the dorsum, pleural plates of the second to sixth segments with each posterior lateral angle produced into a single short tooth and with two widely separated spines on the posterior margin. Pleurites of the seventh and eighth segments small, each bearing two long hairs.

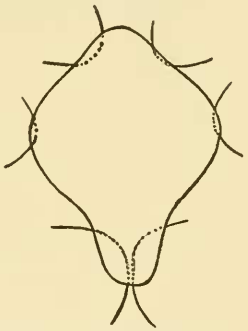

Fig. 10. *Hoplopleura hirta* n. sp.; sternal plate.

On the ventral side the second segment bears but one row of eight spines. Third to sixth segments each with three plates and three rows of spines, the arrangement and number of these spines being practically as on the dorsum, except that each lateral pair on the first plate of the third sternite are much enlarged, as is usual in the genus. Seventh segment with a single transverse row of about eight spines, eighth with four spines.

Description of male: Length, 1.05 mm.; length of head,

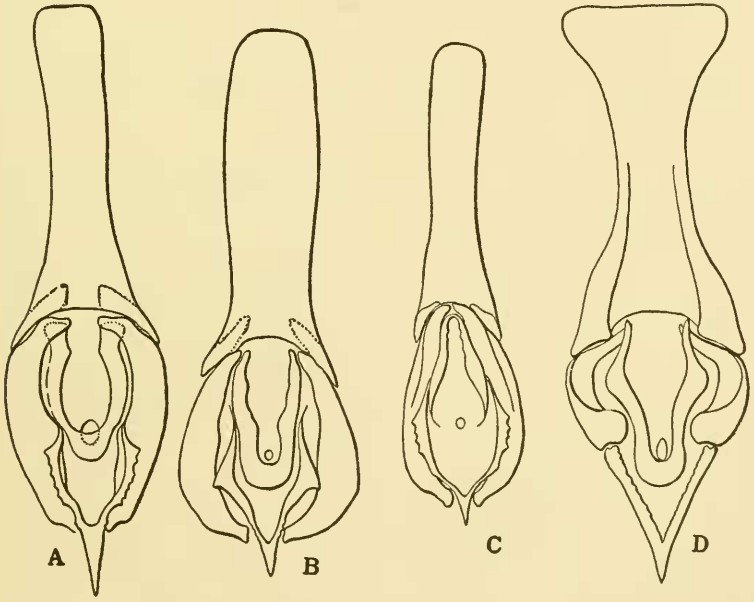


Fig. 11. *A, Hoplopleura arboricola* (K. & F.); genitalia of male. *B, Hoplopleura hirsuta* sp. nov.; genitalia of male. *C, Hoplopleura quadridentata* (Neum.); genitalia of male. *D, Hoplopleura trispinosa* (K. & F.); genitalia of male.

.25 mm.; length of abdomen, .75 mm.; width of head, .16 mm.; width of thorax, .26 mm.; width of abdomen, .4 mm.

The rows of hairs on the abdomen are fewer than in the female. None of the tergites are divided and of the sternites the fourth and fifth are divided into three plates and the third into two. The number of the spines to each plate is practically as in the female.

The genitalia differ from the genitalia of *H. arboricola* in the broader basal plate and the differently shaped parameres and penis.

### Hoplopleura quadridentata Neum.

*Hæmatopinus (Polyplax) quadridentatus* Neumann, Archives de Parasitologie, Vol. 13, pp. 511–513, figs. 13–14 (1909).

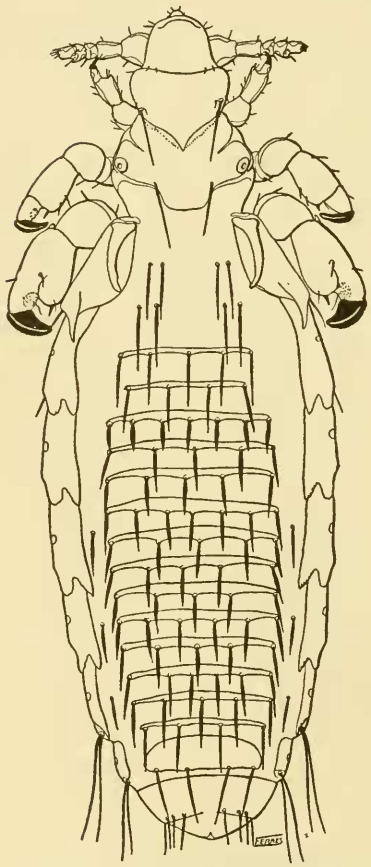

Fig. 12. *Hoplopleura quadridentata* (Neum.); female.

Many males and females from several skins of *Nesoryzomys narboroughi* and *N. indefessus* (Family Muridæ) from the Galapagos Islands, in the Stanford University collection. Neumann's specimens were from another murid, *Holochilus squamipes*, and were taken in Peru.

The pleural plates of the specimens at hand differ somewhat from Neumann's figure, but these differences are such that they may easily be due to mistakes in drawing or to mere variation, of which there appears to be a certain amount. The appended figures will serve to supplement Neumann's description.

As showing how slight our knowledge of the Anoplura is, it is worthy of note that this is the fourth record of an Anopluran from the South American region. Two other species

have been recorded, one from a llama and one from the vizcacha, these with the records given above constituting the sum of our knowledge of the Anoplura of South America.

## Additions to the Mammalian Host List of the Anoplura and Mallophaga.

### Order Carnivora.

#### Family *Canidæ*.

Vulpes cascadensis (red fox).

[1](M) *Trichodectes quadraticeps* Chapman (Mt. Shasta, Calif.).

#### Family *Mustelidæ*.

Gulo luscus ssp.? (wolverine).

(M) *Trichodectes retusus* Nitzsch (Yosemite National Park, Calif.).

Martes sp.? (marten).

(M) *Trichodectes retusus* Nitzsch (Yosemite National Park, Calif.).

### Order Rodentia.

#### Family *Sciuridæ*.

Sciurus hudsonicus vancouverensis.

(A) *Enderleinellus sphærocephalus* Nitzsch (Kuiu Island, Alaska).

Sciurus hudsonicus petulans.

(A) *Enderleinellus sphærocephalus* Nitzsch (Glacier Bay, Alaska).

Sciurus douglasi albolimbatus (Douglas squirrel).

(A) *Enderleinellus sphærocephalus* Nitzsch (Yosemite National Park).

Sciurus griseus (gray squirrel).

(A) *Enderleinellus kelloggi* Ferris (Mariposa Co., Calif.).

Sciurus griseus nigripes.

(A) *Enderleinellus kelloggi* Ferris (Stanford University, Calif.).

Sciurus arizonensis huachucha.

(A) *Enderleinellus longiceps* K. & F. (Huachucha Mts., Ariz.).

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[1] (M), indicates a Mallophagan species; (A), an Anopluran species.

Sciurus niger flaviventer.

(A) *Enderleinellus longiceps* K. & F. (De Kalb Co., Ind.).

Eutamias alpinus (mountain chipmunk).

(A) *Neohæmatopinus pacificus* K. & F. (Yosemite National Park, Calif.).

(A) *Hoplopleura arboricola* K. & F. (Yosemite National Park, Calif.).

Eutamias speciosus frater.

(A) *Neohæmatopinus pacificus* K. & F. (Yosemite National Park, Calif.).

(A) *Hoplopleura arboricola* K. & F. (Yosemite National Park, Calif.).

Eutamias merriami pricei.

(A) *Hoplopleura arboricola* K. & F. (Stanford University, Calif.).

Marmota flaviventris sierræ (marmot or woodchuck).

(A) *Linognathoides montanus* Osborn (Yosemite National Park, Calif.).

Cynomys leucurus (prairie dog).

(A) *Linognathoides montanus* Osborn (Routt Co., Colo.).

(A) *Enderleinellus suturalis* Osborn.

Cynomys gunnisoni.

(A) *Enderleinellus suturalis* Osborn (Florissant, Colo.).

Citellus beldingi

(A) *Enderleinellus suturalis* Osborn (Yosemite National Park, Calif.).

Citellus grammurus.

(A) *Linognathoides montanus* Osborn (Santa Catalina Mts., Ariz.).

Citellus plesius ablusus.

(A) *Linognathoides montanus* Osborn (Prince William Sound, Alaska).

Citellus mollis.

(A) *Enderleinellus suturalis* Osborn (Virginia Valley, Nev.).

Citellus oregonus.

(A) *Enderleinellus suturalis* Osborn (Pine Forest Mts., Nev.).

(A) *Linognathoides montanus* Osborn.

Citellus townsendi.

(A) *Enderleinellus suturalis* Osborn (Wallula, Wash.).

Ammospermophilus nelsoni.

(A) *Enderleinellus suturalis* Osborn (Bakersfield, Calif.).

Xerospermophilus tereticaudus.

(A) *Enderleinellus suturalis* Osborn (Imperial Co., Calif.).

Family *Petauristidæ*.

Glaucomys sabrinus lascivus (flying squirrel).

(A) *Hoplopleura trispinosa* K. & F. (Yosemite National Park, Calif.).

(A) *Enderleinellus uncinatus* Ferris (Yosemite National Park, Calif.).

(A) *Neohæmatopinus sciuropteri* Osborn (Yosemite National Park, Calif.).

Family *Muridæ*

Mus musculus (house mouse).

(A) *Hoplopleura hesperomydis* Osborn (Stanford University, Calif.).

Peromyscus maniculatus gambeli (white-footed mouse).

(A) *Hoplopleura hesperomydis* Osborn (Yosemite National Park, Calif.).

(A) *Polyplax auricularis* K. & F. (Yosemite National Park, Calif.).

Onychomys torridus pulcher (grasshopper mouse).

(A) *Hoplopleura hesperomydis* Osborn (Victorville, Calif.).

(A) *Polyplax auricularis* K. & F. (Victorville, Calif.).

Onychomys leucogaster arcticeps.

(A) *Hoplopleura hesperomydis* Osborn (Colorado Springs, Colo.).

(A) *Polyplax auricularis* K. & F. (Colorado Springs, Colo.).

Neotoma fuscipes streatori (wood rat).

(A) *Linognathoides inornatus* K. & F. (Yosemite National Park, Calif.).

Microtus (Lagurus) intermedius.

(A) *Hoplopleura acanthopus* var. *americanus* K. & F. (Pine Forest Mts., Nev.).

(A) *Polyplax spinulosa* Burm. (Pine Forest Mts., Nev.).

Nesoryzomys indefessus.

(A) *Hoplopleura quadridentata* Neum. (Galapagos Islands).

Nesoryzomys narboroughi.

(A) *Hoplopleura quadridentata* Neum. (Galapagos Islands).

Sigmodon hispidus.

(A) *Hoplopleura hirsuta* Ferris (Raleigh, N. C.).

Sigmodon hispidus texianus.

(A) *Hoplopleura hirsuta* Ferris (Rockport, Tex.).

Sigmodon hispidus eremicus.

(A) *Hoplopleura hirsuta* Ferris (Ft. Yuma, Calif.; Sacaton, Ariz.).

Family *Heteromyidæ*.

Dipodomys deserti (kangaroo rat).

(A) *Fahrenholzia pinnata* K. & F. (Mecca, Riverside Co., Calif.).

Dipodomys merriami ssp.?

(A) *Fahrenholzia pinnata* K. & F. (Inyo Co., Calif.).

Perodipus sp.?

(A) *Fahrenholzia pinnata* K. & F. (Coulterville, Mariposa Co., Cal.).

Microdipodops polionotus.

(A) *Fahrenholzia pinnata* K. & F. (Benton, Mono Co., Calif.).

Perognathus parvus olivaceus (pocket mouse).

(A) *Fahrenholzia pinnata* K. & F. (Pine Forest Mts., Nev.).

Perognathus californicus ssp.?

(A) *Fahrenholzia tribulosa* Ferris (Pleasant Valley, Mariposa Co., Calif.).

Perognathus formosus.

(A) *Fahrenholzia tribulosa* Ferris (Victorville, Calif.).

Family *Geomyidæ*.

Geomys cumberlandius (gopher).

(M) *Trichodectes geomydis* Osborn (Cumberland Island, Ga.).

Thomomys monticola (gopher).

(M) *Trichodectes geomydis* Osborn (Yosemite National Park, Calif.).